BACTERIOLOGICAL REVIEWS

VOLUME 32 • NUMBER 4 • December 1968

EDITORIAL BOARD

EDWARD A. ADELBERG, Editor
Yale University

New Haven, Conn.

Thomas Anderson (1969) Robert Austrian (1969) Bernard D. Davis (1970) H. S. Ginsberg (1969)

I. C. Gunsalus (1970) R. G. E. Murray (1970) Alfred Nisonoff (1970) Sidney Raffel (1969) Morrison Rogosa (1969) Harry Rubin (1970) Roger Y. Stanier (1969) Helen R. Whiteley (1969)

ROBERT A. DAY, Managing Editor, 4715 Cordell Ave., Bethesda, Md. 20014

EX OFFICIO

DENNIS W. WATSON, President (1968–1969) E. M. FOSTER, Vice-President (1968–1969) DONALD E. SHAY, Secretary H. B. WOODRUFF, Treasurer

Correspondence relating to editorial matters should be addressed to the Editor, Edward A. Adelberg, Department of Microbiology, Yale University School of Medicine, New Haven, Connecticut 06510.

Bacteriological Reviews, a publication of the American Society for Microbiology, 4715 Cordell Ave., Bethesda, Md. 20014, accepts reviews and monographs dealing with all aspects of microbiology. Reviews is published quarterly (March, June, September, and December), one volume per year. The subscription price is \$6 per year. Single copies are \$2.25. Members of ASM may receive Reviews as part of their dues. Correspondence relating to reprints, defective copies, availability of back issues, or lost or late proofs should be directed to the ASM Publications Office, 4715 Cordell Ave., Bethesda, Md. 20014. Corre-

spondence from ASM members relating to membership dues, member subscriptions, changes of address, incorrect address, incorrect journals, etc., should be directed to the American Society for Microbiology, 1913 I St., N.W., Washington, D.C. 20006. Nonmembers of the Society should write to The Williams & Wilkins Co., 428 E. Preston St., Baltimore, Md. 21202, regarding institution of nonmember subscriptions and nonreceipt of journals.

Second-class postage paid at Baltimore, Md., and at additional mailing offices.

Made in the United States of America.

Copyright © 1969, American Society for Microbiology

INSTRUCTIONS TO AUTHORS

Bacteriological Reviews accepts reviews and monographs dealing with all aspects of microbiology. Authoritative and critical reviews of the current state of knowledge are preferred, although historical analyses will be accepted if the importance of the subject justifies this approach. Unevaluated compilations of the literature and annotated bibliographies do not fall within the scope of Bacteriological Reviews. Manuscripts of talks delivered at symposia and round tables are likewise unacceptable; however, their authors are encouraged to discuss with the Editor the possibility of using such material as the basis for preparation of a review, when publication in this form seems appropriate.

Monographs should embody the results of unusually extensive and well-rounded original investigations, the usefulness of which would be diminished by publication in the form of a series of separate papers. Past experience suggests that the monograph is particularly appropriate for the presentation of a definitive study on the biology of a microbial group.

Members of the Editorial Board will welcome any suggestions of topics and authors, either from prospective authors or from others. Prospective authors are advised to discuss with the Editor the suitability of their proposed contribution. The preparation of a synopsis or topical outline is desirable, since it often elicits constructive suggestions from editorial consultants. A review cannot, of course, be finally accepted until the finished product has been examined.

The editorial style of Bacteriological Reviews conforms to the Style Manual for Biological Journals (AIBS, Washington, D.C.; \$3.00). References should be listed alphabetically according to the last name of the senior author, numbered serially, and cited by number in the text. For example: 136. Salton, M. R. J. 1952. Cell wall of Micrococcus lysodeikticus as the substrate of lysozyme. Nature 170:746-747. A table of contents showing the major headings and subheadings of the text is usually desirable; consult recent issues of Bacteriological Reviews for style. All abbreviations used (except those for standard units of measurement) should be defined parenthetically at first use in the text. Biochemical abbreviations should essentially follow the rules of the IUPAC-IUB (J. Biol. Chem. 241:527, 1966). Enzyme activity should be expressed in terms of international units (Enzyme Nomenclature, Elsevier Publishing Co., 1965), and the E. C. number should be given parenthetically at first use in the text. Genetics symbols introduced by the reviewer should essentially follow the recommendations of Demerce et al. (Genetics 54:61, 1966).

To expedite editorial review and preparation for the printers, the author should submit two copies of the manuscript, including illustrations. Original drawings should not be submitted; glossy prints are required, not larger than 8½ by 11 inches and preferably not smaller than 5 by 7 inches. When appropriate, magnification should be indicated by a suitable scale on the photograph. All material should be double-spaced, including quotations, tables, legends for text figures, and references. This is essential to allow space for corrections and printer's instructions. Each reference cited should be checked with the original publication; titles and both first and last pages should be included. References to Unpublished Data and Private Communication should be kept to a minimum; if unavoidable, these citations should be made in the text only, not in the list of references. It is preferable to summarize supporting evidence whenever possible. When original data are presented, it is essential that the methods be fully described or that reference be made to previously published methods. It is the author's responsibility to obtain permission from the copyright owner to reproduce figures, tables, or quotations of more than 12 lines of text taken intact from previous publications, either his own or those of another author. Note that the journal or publisher (not the author) is the copyright owner; however, as a matter of courtesy the author's permission should be obtained as well. Each contributor will receive 500 gratis reprints of his contribution; additional reprints (in multiples of 100) may be purchased if desired. A table showing the cost of reprints, and an order form, will be sent with the proof. There are no page charges.

BACTERIOLOGICAL REVIEWS

ACKNOWLEDGMENT

Sincere appreciation is expressed to the following scientists, who served as Consultants to the Editorial Board and generously gave their time and talent for the review of manuscripts during 1968.

Stanley Falkow Howard Gest Harlyn Halvorson, Jr. Peter Lengyel Frederick Neidhardt Edgar Ribi Jack Strominger D. Vazquez

AUTHOR INDEX

Ajl, Samuel, J., 1

Baron, L. S., 362 Bergman, R. K., 103 Bott, Kenneth F., 370 Braun, Werner, 291 Brock, T. D., 139 Broda, Paul, 206

Charamella, Leigh J., 320 Copeland, James C., 302 Crandall, M. A., 139 Curtiss, Roy, III, 320

Dannenberg, Arthur M., Jr., 85 Darnell, James E., Jr., 262 Datta, Naomi, 55 Davies, Julian, 493

Edlin, Gordon, 206 Epstein, H. T., 313 Erickson, Robert J., 291

Friedman, S. Marvin, 27

Gemski, P., Jr., 362 Ghuysen, Jean-Marie, 425 Gibson, Frank, 465 Gwinn, Darrel D., 297

Hsiung, G. D., 185 Hsu, Yu-Chih, 387 Johnson, E. M., 362

Lanni, Yvonne Thery, 227 Lawton, William D., 297 Luria, S. E., 401

Marmur, Julius, 302 Mays, Jane Ann, 320 Meynell, Elinor, 55 Meynell, G. G., 55 Munoz, J., 103

Pène, Jacques J., 379 Pittard, James, 465

Rabin, Robert, 1 Reeves, Henry C., 1 Romig, W. R., 349 Ryter, Antoinette, 39

Smith, H., 164 Stallions, Donald R., 320 Sulitzeanu, D., 404

Thorne, Curtis B., 358

Vernon, Leo P., 243

Wegener, Warner S., 1 Weisblum, Bernard, 493 Wilson, Gary A., 370 Wohlhieter, J. A., 362 Woodson, Bruce, 127

SUBJECT INDEX

agglutinating Hansenula wingei, evolution and ecology, 139 amino acids, aromatic, 465 animal cells, ribonucleic acids from, 262 antibiotic inhibitors of the bacterial ribosome, 493 antibody formation, relation of antigen affinity for white cells, 404 antigen, affinity for white cells, 404 aromatic biosynthesis, pathways 465

Bacillus, identification of genetic functions in, 305 Bacillus anthracis, transduction in, 358 Bacillus cereus, transduction in, 358 Bacillus stearothermophilus, protein synthesis, 27 Bacillus subtilis, alteration of host specificity, 297 Bacillus subtilis, competence for transformation and transfection, 313

Bacillus subtilis, development of competence for transfection, 370

Bacillus subtilis, infected, host synthesis in, 379 Bacillus subtilis, infectious prophage, 349 Bacillus subtilis, transformation, 291

bacteria, histamine-sensitizing properties, 103 bacteria, nucleus and membrane, 39

bacterial competence, factors affecting, 313 bacterial matings, intergeneric, 362

bacterial pathogenicity, 164

bacterial photosynthesis, reaction of, 243

bacterial plasmids, transmissible, relationship to drug-resistance factors, 55 bacterial ribosome, antibiotic inhibitors, 493

bacteriolytic enzymes, use in determination of wall structure, 425

bacteriophage, host, restriction, 297

bacteriophage deoxyribonucleic acids from Bacillus subtilis, 349

bacteriophage-infected Bacillus subtilis, host synthesis in, 379

bacteriophage T5, first-step-transfer deoxyribonucleic acid of, 227

biochemistry of ribonucleic acid, 262

Bordetella pertussis, histamine-sensitizing factors from, 103

carrier cells, viral infection in, 387 cell metabolism, role of bacteriolytic enzymes, 425 cellular hypersensitivity in the pathogenesis of tuber-

culosis, 85 cellular immunity in the pathogenesis of tuberculosis,

competence for transfection in Bacillus subtilis, 370 conjugation, mechanism in Escherichia coli K-12, 320

deoxyribonucleic acid, review of research progress, 127

deoxyribonucleic acid of the recipient cell, its role in transformation, 291

drug-resistance factors in Enterobacteriaceae, 55 electron transport reactions of bacterial photosynthesis, 243

Enterobacteriaceae, drug-resistance factors, 55 enzymes, bacteriolytic, role in metabolism, 425 Escherichia coli, ribonucleic acid control locus, 206 Escherichia coli K-12, conjugation in, 320

F- recipients of Escherichia coli, conjugation with Hfr donors, 320 fatty acids, short-chain, pathways of metabolism, 1

first-step-transfer deoxyribonucleic acid of bacteriophage T5, 227

gene conservation in Bacillus, 305 genetic relatedness, in Bacillus, 305 glyoxylate, relationship to fatty acid metabolism, 1 glyoxylate-condensing enzymes, formation of, 1 gram-negative bacteria, structure, 39 gram-positive bacteria, structure, 39

Hansenula wingei, molecular basis of mating, 139 Hfr donors of Escherichia coli, conjugation with Frecipients, 320

histamine-sensitizing properties of bacteria, 103 host specificity in Bacillus subtilis, alteration, 297 host synthesis in infected Bacillus subtilis, 379 hybridization, chromosomal, of Salmonella and Proteus with Escherichia coli, 362

inhibitors of the bacterial ribosome, 493 intergeneric bacterial matings, 362

latent virus infections in primate tissues, 185

macrophage in tuberculosis, activation and proliferation, 85

mating in the yeast Hansenula wingei, molecular basis, 139

membrane of bacteria, 39

metabolism, fatty acid, effect of glyoxylate, 1 metabolism of cells, use of bacteriolytic enzymes, 425 microbial agents, histamine-sensitizing factors from,

microbial pathogenicity, biochemical challenge, 164 microbiologist and his times, an essay, 401

nucleic acids, foreign, entrance into bacterial cells, 291 nucleus of bacteria, 39

phage SPO2, biological properties, 349 photochemical reaction of bacterial photosynthesis, 243

poxvirus research, recent progress, 127 primate tissues, latent virus infections, 185 progress in poxvirus research, review, 127 protein synthesis, inhibitors of, 493

protein synthesis, regulatory connection to ribonucleic acid synthesis, 206

protein-synthesizing machinery of thermophilic bacteria, 27

R factors in *Enterobacteriaceae*, 55
replication of deoxyribonucleic acid, dependence of transformation on, 29.
ribonucleic acid control locus in *Escherichia coli*, 206
ribonucleic acid synthesis, regulation, 206
ribonucleic acids from animal cells, 262
ribosomal function, 493

sexual agglutination in *Hansenula wingei*, 139 simian viruses, 185

thermophilic bacteria, protein-synthesizing machinery, 27
transduction in *Bacillus cereus* and *B. anthracis*, 358
transfection in *Bacillus subtilis*, 313
transfer of viral deoxyribonucleic acid, 227

transformation, role of recipient cell deoxyribonucleic acid, 291

transformation in Bacillus subtilis, 313

tuberculosis, cellular hypersensitivity and immunity, 85

tuberculosis, macrophage activation and proliferation, 85

viral deoxyribonucleic acid, transfer, 227 viral infection in carrier cells, 387 virus, a review of research progress, 127 virus infections, latent, in primate tissues, 185 vitamins, their control in microorganisms, 465

white cells, affinity of antigen for, 404

BACTERIOLOGICAL REVIEWS

VOLUME 32

BALTIMORE, MD. 1968



CONTENTS

No. 1, March

Alternate Pathways of Metabolism of Short-Chain Fatty Acids.	
WARNER S. WEGENER, HENRY C. REEVES, ROBERT RABIN, AND SAMUEL J. AJL	1–26
Protein-synthesizing Machinery of Thermophilic Bacteria.	1-20
S. Marvin Friedman	27–38
Association of the Nucleus and the Membrane of Bacteria: a Morphological Study	
Antoinette Ryter	39–54
Phylogenetic Relationships of Drug-Resistance Factors and Other Transmissible Bacterial Plasmids.	
ELINOR MEYNELL, G. G. MEYNELL, AND NAOMI DATTA	55-84
No. 2, June	
Cellular Hypersensitivity and Cellular Immunity in the Patho-	
genesis of Tuberculosis: Specificity, Systemic and Local Nature, and Associated Macrophage Enzymes.	
ARTHUR M. DANNENBERG, JR	85-102
Histamine-sensitizing Factors from Microbial Agents, with	
Special Reference to Bordetalla pertussis. J. Munoz and R. K. Bergman	103-126
Recent Progress in Poxvirus Research.	
Bruce Woodson	127–138
No. 3, September	
Molecular Basis of Mating in the Yeast Hansenula wingei.	100 160
M. A. CRANDALL AND T. D. BROCK	139–163
H. Smith	164–184
Latent Virus Infections in Primate Tissues with Special Reference	
to Simian Viruses. G. D. HSIUNG	185 205
Physiology and Genetics of the "Ribonucleic Acid Control" Locus	165-205
in Escherichia coli.	
GORDON EDLIN AND PAUL BRODA	206–226
First-Step-Transfer Deoxyribonucleic Acid of Bacteriophage T5. YVONNE THERY LANNI	227-242
Photochemical and Electron Transport Reactions of Bacterial	
Photosynthesis.	242 261
LEO P. VERNON	243-201
JAMES E. DARNELL, JR	262-290
No. 4, December, Part 1	
Apparent Dependence of Transformation on the Stage of De-	
oxyribonucleic Acid Replication of Recipient Cells ROBERT J. ERICKSON AND WERNER BRAUN	291_296
ACCURATE OF LINCORDOR AND WERRING BRAUM	

Alteration of Host Specificity in Bacillus subtilis.	
DARREL D. GWINN AND WILLIAM D. LAWTON	297-301
Identification of Conserved Genetic Functions in Bacillus by Use	
of Temperature-sensitive Mutants.	
JAMES C. COPELAND AND JULIUS MARMUR	302-312
Factors Affecting Bacterial Competence for Transfection and	
Transfection Enhancement.	
H. T. Epstein	313-319
Parental Functions During Conjugation in Escherichia coli K-12.	
ROY CURTISS, III, LEIGH J. CHARAMELLA, DONALD R. STAL-	
	320-348
Infectivity of Bacillus subtilis Bacteriophage Deoxyribonucleic	
Acids Extracted from Mature Particles and from Lysogenic	
Hosts. W. R. Romig	349-357
Transduction in Bacillus cereus and Bacillus anthracis.	
CURTIS B. THORNE	358-361
Intergeneric Bacterial Matings.	
L. S. BARON, P. GEMSKI, JR., E. M. JOHNSON, AND J. A.	
	362-369
Metabolic and Nutritional Factors Influencing the Development	
of Competence for Transfection of Bacillus subtilis.	
Kenneth F. Bott and Gary A. Wilson	370-378
Host Macromolecular Synthesis in Bacteriophage-infected Bacil-	0.0 0.0
lus subtilis.	
JACQUES J. PÈNE	379-386
Propagation or Elimination of Viral Infection in Carrier Cells.	
YU-CHIH HSU	387-399
No. 4, December, Part 2	
Editorial	3
The Microbiologist and His Times.	
S. E. Luria	401-403
Affinity of Antigen for White Cells, and Its Relation to the In-	
duction of Antibody Formation.	
D. SULITZEANU	404-424
Use of Bacteriolytic Enzymes in Determination of Wall Struc-	
ture and Their Role in Cell Metabolism.	
Jean-Marie Ghuysen	425-464
Pathways of Biosynthesis of Aromatic Amino Acids and Vitamins	
and Their Control in Microorganisms.	
Frank Gibson and James Pittard	465-492
Antibiotic Inhibitors of the Bacterial Ribosome.	
BERNARD WEISBLUM AND JULIAN DAVIES	
Letters to the Editor	529-530
Author Index	
Subject Index	ii–iii